PEACE/WILLISTON
FISH & WILDLIFE
COMPENSATION
PROGRAM

BC hydro

BRITISH
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A Reconnaissance Survey Of Le Moray Lake #3

A. R. Langston and A. R. McLean
1998

PWFWCP Report No. 136

105-02923/

The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

Peace/Williston Fish and Wildlife Compensation Program, 1011 Fourth Ave. 3rd Floor, Prince George B.C. V2L 3H9

Website: *www.bchydro.bc.ca/environment/initiatives/pwcp/*

This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

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A RECONNAISSANCE SURVEY OF

LE MORAY LAKE #3*

WATERSHED:	Pine River
DATE OF SURVEY:	July 28, 29, 1992
FIELD CREW LEADER:	A.R. McLean
FIELD ASSISTANT:	M. Hunter

PEACE/WILLISTON FISH AND WILDLIFE COMPENSATION PROGRAM

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and

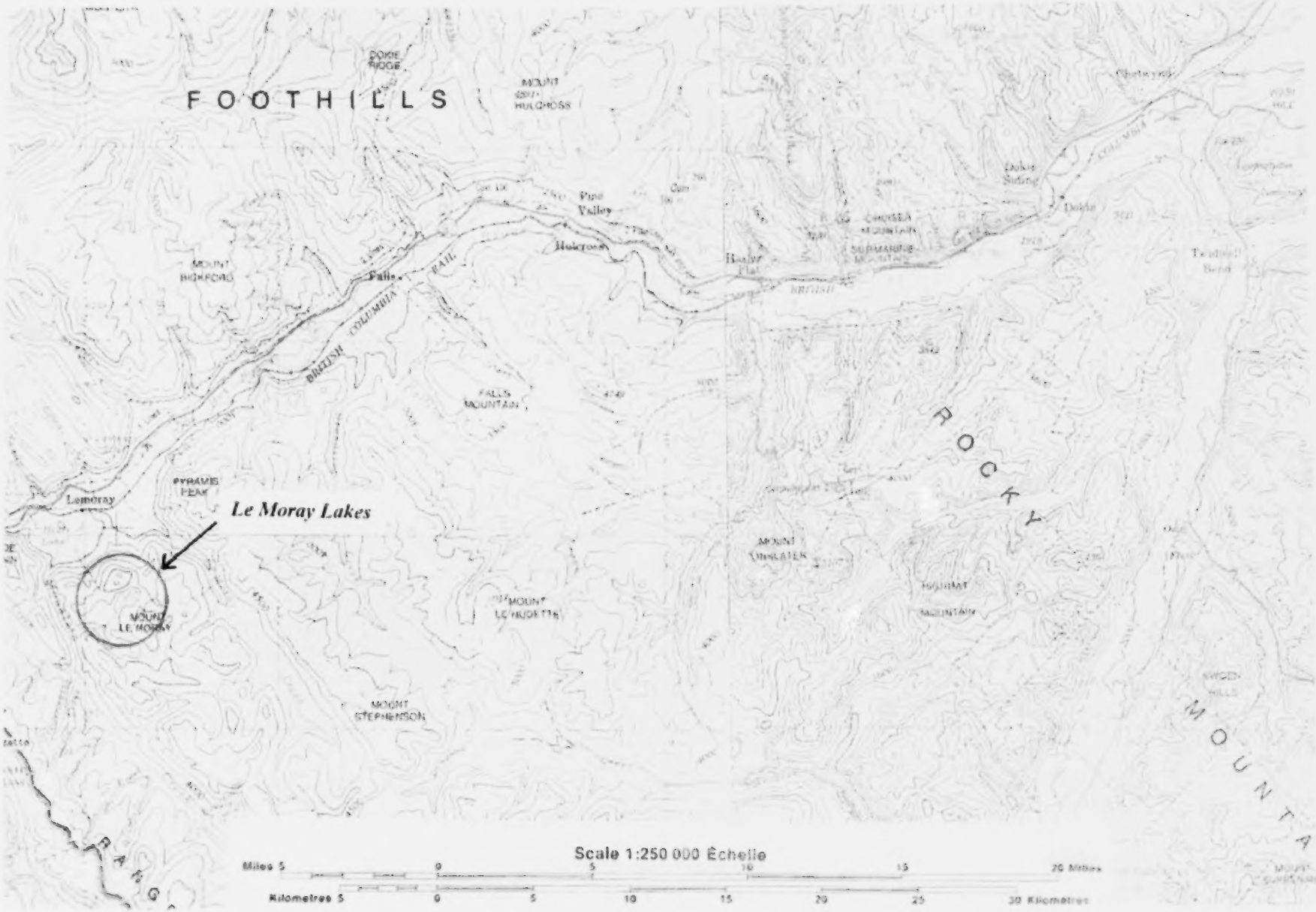
MINISTRY OF ENVIRONMENT, LANDS AND PARKS

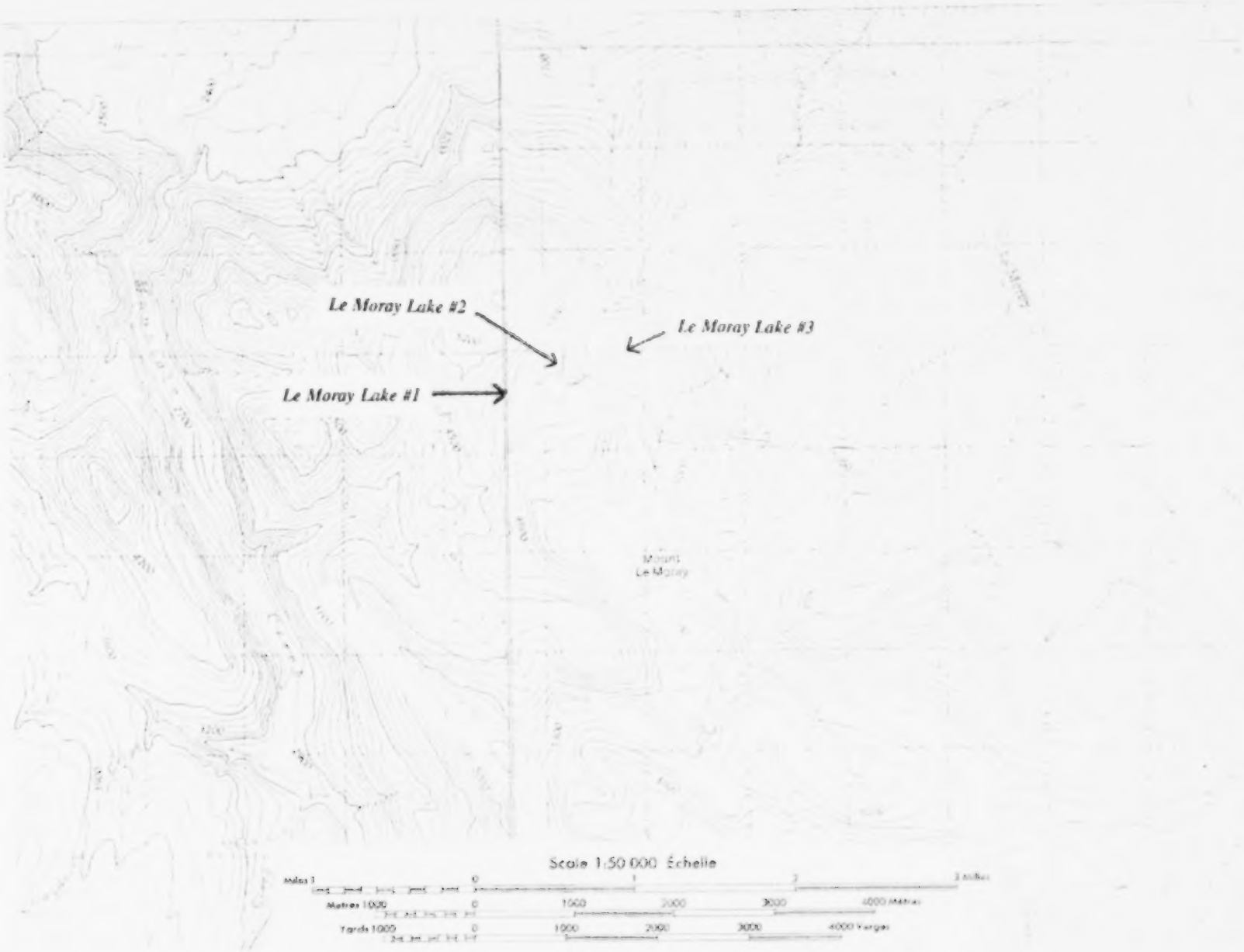
REPORT PREPARED BY: A.R. Langston and A.R. McLean

RELEASED BY: _____

Nick Baccante, Regional Fisheries Biologist

***Le Moray Lake #3** is an unofficial name registered with the Geographical Names Unit of the Ministry of Environment, Lands and Parks.


FOOTHILLS
DOKIE RIDGE
MOUNT HULCROSS
Pine Valley
Hulcross
Falls
MOUNT BONFORD
BRITISH COLUMBIA RAIL
FALLS MOUNTAIN
Lemoray
PYRAMID PEAK
Le Moray Lakes
MOUNT LE MORAY
MOUNT LE NORETTE
MOUNT STEPHENSON
Dokie Siding
Dokie
Hasler Flat
ROCKY
MOUNTAIN
Scale 1:250 000 Échelle
Miles 5 0 5 10 15 20 Miles
Kilometres 5 0 5 10 15 20 25 30 Kilometres


Le Moray Lake #2
Le Moray Lake #3
Le Moray Lake #1
Mount
Le Moray
Scale 1:50 000 Échelle
Miles 1
0
1
2
3 miles
Metres 1000
0
1000
2000
3000
4000 Metres
Yards 1000
0
1000
2000
3000
4000 Yards

LAKE: Le MORAY #3

SYSTEM NAME: Unnamed C.

A.S.A.P. REFERENCE NO.:

SYSTEM NO: 234-8120-254-000

DATA ON FILE FOR THIS SURVEY

Location	x	Dissolved 02/Temp. Profiles	x
Physical Data	x	Winter Dissolved 02/Temp. Profiles	x
Bench Mark	x	Netting Record	x
Terrain Features	x	Lake Catch Summary	x
Access	x	Individual Fish Data	--
Resorts and Campsites	x	Fish Preserved	--
Other Developments	x	Stomach Analysis	--
Obstructions and Pollutions	x	Scale Reading	--
Special Restrictions	x	Location of Inventory Sites	x
Aquatic Plants	x	Photograph Directory	x
Wildlife Observations	x	Appendices:	
Miscellaneous Comments	x	A: Water Chemistry Analysis	x
Lake Drainage	x	B: Tributary Stream Data	x
Fisheries Management Comments	x	Bathymetric Map Reduction	x
History of Previous Surveys	x	Bathymetric Map	x
Water Chemistry Summary	x		

LOCATION

Location: 60 km southwest of Chetwynd

Elevation: 1417 m +/

Latitude/Longitude: 55°28'06":122°29'04" U.T.M.: 10.5326.61468

Management Unit: 7-22 N.T.S. Map No.: 93-0/8

Drainage: Outlet C. --> Le Moray L. #2 --> Outlet C. --> Le Moray L. #1 --> Mountain C. --> Pine R. --> Peace R.

PHYSICAL DATA

Lake Drainage Area:		km^2	Volume:	176000	m^3
Water Surface Area:	73100	m^2	Flushing Rate:	--	
Area above 6 m contour:	70500	m^2	Perimeter of Islands:	400	m
Shoreline Perimeter:	1400	m	Number of Islands:		2
Maximum Depth:	9.5	m	Mean Depth:	2.4	m
Filterable Residue (TDS):	38	mg/l	Secchi Reading:	5.02	m

Sounding Device: Lowrance X-15 Elevation Source: Contour interpolation

BENCHMARK

(Iron spike, center of red circle) located 9.0 m from shore at lake outlet, in a 28 cm diameter spruce tree. Benchmark is set 2.0 m above current lake level.

High water mark: lake appears to be at maximum pondage.

TERRAIN FEATURES

Immediate Shoreline:

Shoreline is low to moderately sloped to water's edge, with the exception of the steeply sloped east side. Bog willow, hemlock, subalpine fir and spruce front the shoreline, with sedgegrass sparsely intermixed throughout. Shoreline substrate consists of fines, large cobble and boulder. Two small treed islands are located on the lake. Rock shoals are located at either ends of the islands. Lake bottom drops off gradually from shore. Boating access to shore is moderate with access to the lake is best suited to the low sloping southwest and northwest shorelines.

Surrounding Country:

Le Moray Lake #3 is located in the rugged Rocky Mountains. The lake is surrounded by mountainous terrain with a mature forest cover consisting of spruce, subalpine fir and hemlock. Le Moray Lake #3 is located in the Engelmann spruce-subalpine fir biogeoclimatic zone.

ACCESS

Directions:

Le Moray Lake #3 is approximately a 15 minute helicopter flight from Silver Sands Lodge, which is located 70 km west of Chetwynd on Highway 97.
No ground access to the lake was observed.

Road Type and Conditions:

None.

Restrictions:

None noted.

RESORTS AND CAMPSITES

None, however a campsite may be best suited to the low-lying, level northwest end. A small campsite may also be suitable on the larger island.

OTHER DEVELOPMENTS

None noted.

OBSTRUCTIONS AND POLLUTIONS

Due to subterranean flow, both upstream and downstream fish passage is obstructed in the first 9 m of the outlet, at current lake levels. A cascade (1 .8 m drop over 4.0 m) is present approx. 30 m downstream of the lake. Upstream fish passage past this feature would be very difficult, but remotely possible during high flow. There are no further obstructions to fish passage between Le Moray Lakes #3, #2 and #1. However; 700 metres downstream of Le Moray Lake #1 waterfalls are present. These falls are a definite upstream barrier to fish passage. Numerous other falls and cascades are present on the outlet and Mountain C. (as derived from NTS Map No. 93-0/7 edition 3), some of which may be barriers to upstream fish passage.

SPECIAL RESTRICTIONS

None noted.

AQUATIC PLANTS

Aquatic plants were sparsely located at either ends of the lake. The following species were identified in the field, none were collected.

Equisetum sp. Anacharis sp.

Sedgegrasses

WILDLIFE OBSERVATIONS

5 different species of water fowl.

MISCELLANEOUS COMMENTS

Moderate concentrations of Gammarus noted in lake. Inventories have been conducted on Le Moray Lakes #1 and #2.

Bathymetric map: The lake outline is from an enlargement of aerial photograph B.C. 7188 No. 59, flown June, 1969.

LAKE DRAINAGE

General:

Le Moray Lake #3 has two intermittent inlets and 1 outlet. The outlet flows 125 m west to Le Moray Lake #2. From Le Moray Lake #2, the creek flows 28 m west to it's confluence with Le Moray Lake #1. The creek then flows 3.5 km southwest to Mountain Creek. Mountain Creek flows north 8.5 km to it's confluence with the Pine River.

Major Systems:

None.

Minor Systems:

Unnamed C. - intermittent inlet #1

The initial 150 m of this inlet was investigated. Draining into the south southeast corner of the lake, the inlet had an average wetted width of 0.6 m, average depth of 0.1 m and no noticeable flow. Due to low flows, accessible spawning and rearing habitat is available in marginal and moderate quantities, respectively.

Unnamed C. - intermittent inlet #2

This seasonal inlet affords no spawning potential (organic substrate).

Unnamed C. - outlet

The outlet drains approx. 125 m from the southwest end of Le Moray Lake #3 to Le Moray Lake #2. The entire length of the creek was investigated. Subterranean flow was noted in the initial 9 m of the outlet. A cascade (1.8 m drop over 4.0 m) is present approximately 30 m downstream of the lake. Approximately 50 m downstream from the lake, the creek had an average wetted width of 0.5 m, average depth of 0.1 m, average gradient of 7.5% and a water temperature of 13°C. Approximately 95 m downstream from the lake, the creek had an average wetted width of 2.0 m, average depth of 0.2 m, and an average gradient of 0.2%.

The outlet affords no spawning habitat, but fair rearing habitat throughout (undercut banks, overstream vegetation).

See point sample cards for additional information.

FISHERIES MANAGEMENT COMMENTS

An overnight net set and two minnow traps yielded no fish. The lake is therefore believed to be barren of all fish species. Obstructions to fish passage are present in the initial 9 m and at 30 m downstream on the outlet creek, at present water levels.

Further fish passage barriers are located downstream of Le Moray Lake #1. Spawning and rearing habitat in inlet #1 is marginal and moderate, respectively. Quantity of habitat is dependant on flows. The outlet affords no spawning habitat, but fair rearing habitat throughout. Le Moray Lake #3 is connected to Le Moray Lakes #2 and #1. Gammarus were noted in the lake (qualitative observations suggest moderate concentrations). Oxygen samples taken during the winter of 1991 /92 appear marginally suitable for supporting a fish population.

This subalpine lake may be suitable for a sportfish introduction. The cold water temperatures of this lake would likely result in a "stunted" population if species like rainbow trout are introduced. The outlet stream may not always be a barrier to downstream fish migration, therefore, potential impacts on native fish species in the Pine River drainage should be considered, if this lake is stocked. No ground access to the lake was observed. Potential exists for flow consolidation, stream clearance and spawning habitat improvements on the outlet. Spawning habitat improvements on inlet #1 are also feasible pending possible access and fish introductions. Management considerations for Le Moray Lake #3 should include Le Moray Lakes #1 and #2.

HISTORY OF PREVIOUS SURVEYS

Lake Surveys:

An oxygen/temperature series was collected on March 3, 1991 by A.R. Langston and A.R. McLean, Peace Fisheries Compensation Program, Prince George, B.C.

Other Related Surveys:

None known.

WATER CHEMISTRY SUMMARY **Limnology Station No. 1**

Field Conditions:

Date:	July 29, 1992		
Time:	0900 hrs	Air Temperature:	16.0°C
Wind Velocity:	15 km/hr	Wind Direction:	south
Cloud Cover:	1 /10 o.c.	Surface Condition:	light ripple
Secchi Disc:	5.02 m	Water Colour:	gin clear

Method(s) Used:

Dissolved Oxygen:	YSI model 58 oxygen/temperature meter
Water Temperature:	YSI model 58 oxygen/temperature meter
Air Temperature:	Hand-held alcohol thermometer
Ph (field):	Digital pH pocket tester
H2S (field):	Hach H2S field test kit
Laboratory Used:	Zenon Environmental Inc. B.C. Laboratory Services
Water Sampler:	Verticle Alpha Water Bottle (Vandorn)
Substrate Sampler:	Substrate sample not taken

Water Sample Chemistry: SEAM Site No.: Not determined

	Sampling Depths	
	Surface (0 m)	Lower (9.0 m)
pH (field)	8.9	7.9
pH (lab)	7.4	7.0
Specific Conductance (lab)	52 umhos/cm	58 umhos/cm
Filterable Residue 105°C (lab)	38 mg/l	50 mg/l
H2S (field)	-- mg/l	0 mg/l
Bottom Depth:	9.3 m	
Substrate Sample Depth:	--- m	

NOTE: Lab ph analyzed outside of optional time frame.

Lake: **Le Moray (#3)**

OXYGEN/TEMPERATURE DATA

SUMMER

Crew: A.R. McLean
M. Hunter
Date: July 29, 1992

DEPTH (m)	02 (mg/l)	TEMP (°C)
Surface	8.8	13.0
1.0	8.3	13.0
2.0	8.5	13.0
3.0	8.5	13.0
4.0	8.5	12.9
5.0	8.5	12.3
6.0	7.9	9.5
7.0	6.5	7.3
8.0	5.1	6.3
8.5	4.5	6.2
9.3	Bottom	

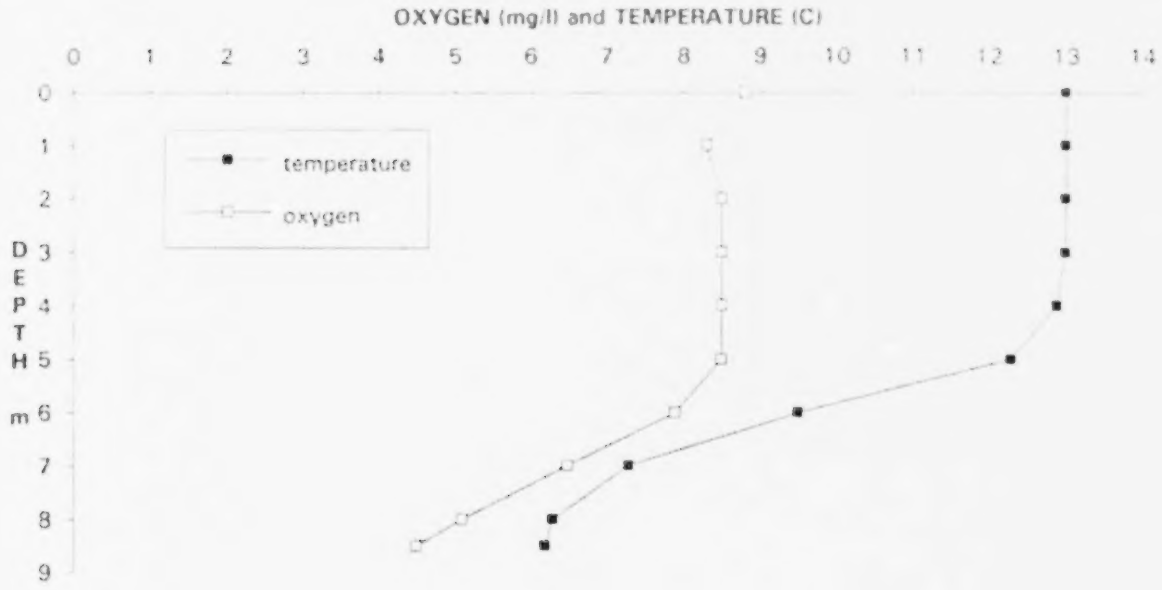
WINTER

Crew: A.R. Langston
A.R. McLean
Date: March 3, 1992
Snow depth: 4.0 cm
Ice Depth: 120 cm

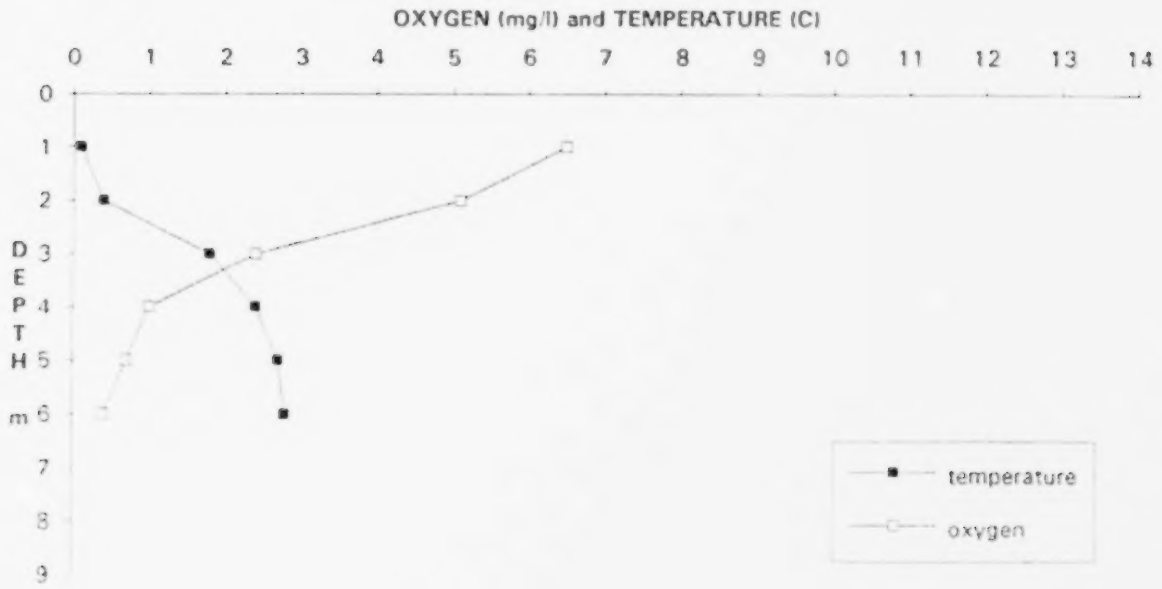
DEPTH (m)	02 (mg/l)	TEMP (°C)
* Surface		
1.0	6.5	0.1
2.0	5.1	0.4
3.0	2.4	1.8
4.0	1.0	2.4
5.0	0.7	2.7
6.0	0.4	2.8
7.0	Bottom	

* Surface is referenced from top of ice, i.e. surface = top of ice.

SUMMER OXYGEN/TEMPERATURE PROFILES



WINTER OXYGEN/TEMPERATURE PROFILES



NETTING RECORD

Mesh sizes experimental order: 25, 76, 51, 89, 38, 64 mm

NETTING SITE #1

Type:	Sinking monofilament		
Date Set:	July 28, 1992	Time:	1530 hrs
Date Lifted:	July 29, 1992	Time:	0845 hrs
Net Dimensions:	Length: 91.4 m	Depth:	2.4 m
Shallow End Mesh Size:	25 mm	Depth:	1.0 m
		Substrate:	cobble
Deep End Mesh Size:	64 mm	Depth:	5.5 m
		Substrate:	fines

Comments:

1 unidentified species of water fowl was captured in net.

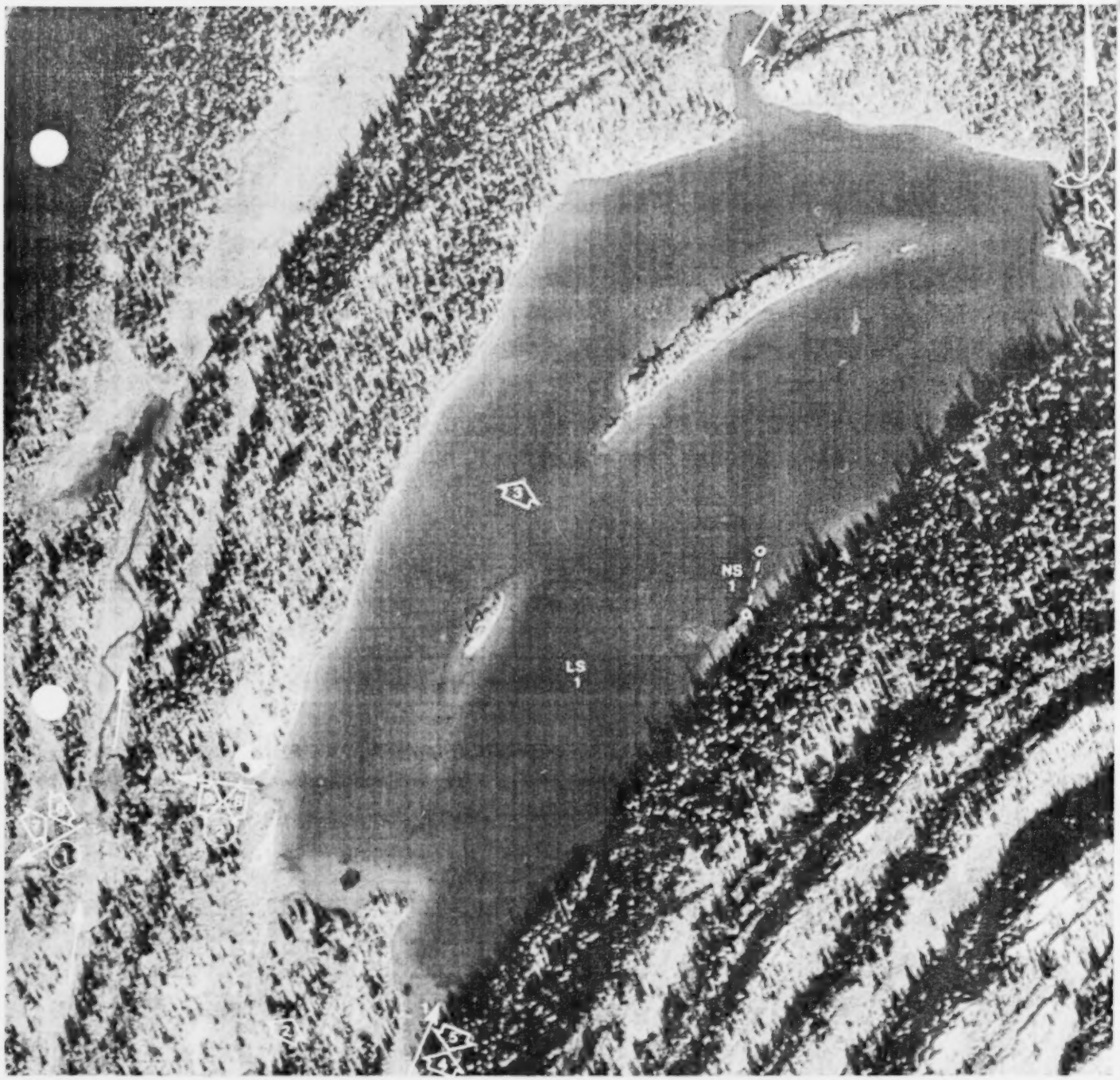
LAKE CATCH SUMMARY

No fish netted.

Minnow Traps:

BAIT: Sardines

#	HOURS	DEPTH (m)	SUBSTRATE	SPECIES	SIZE RANGE (cm)
1	17.30	1.0	large cobble	6 Gammarus	
2	17.30	1.5	fines		



LOCATION OF INVENTORY SITES

Figure 1

Lake: Le Moray #3

Reference No.: B.C 89064:004

Reference Date: August 1989

Scale: 1:2350

Plate number, area, and direction

Point sample, number, and location

Bench mark

Limno station location and number

Netting site location and number

Stream flow direction and number

PHOTOGRAPH DIRECTORY

Negative #	Plate #	Description
R7:2A	1	Aerial view of Le Moray Lake #3 looking southwest. Arrow indicates location of outlet.
R7:1	2	Aerial view of Le Moray Lake #3 looking northeast.
R7:16A,17A	3	Panoramic view looking north, taken from middle of lake.
R7:6A	4	Downstream view of seasonal inlet #1, taken approx. 10 m upstream from lake.
R7:5A	5	Upstream view of seasonal inlet #1, taken approx. 10 m upstream from lake.
R7:12A	6	Downstream view of point sample site #1 on outlet, taken approx. 95 m downstream from the lake.
R7:1 OA	7	Upstream view of point sample site #1 on outlet, taken approx. 95 m downstream from the lake.
R7:8A	8	Downstream view of point sample site #2 on outlet, taken approx. 50 m downstream from lake.
R7:13A	9	Upstream view of point sample site #2 on outlet, taken approx. 50 m downstream from lake.

Lake: **Le Moray (#3)**

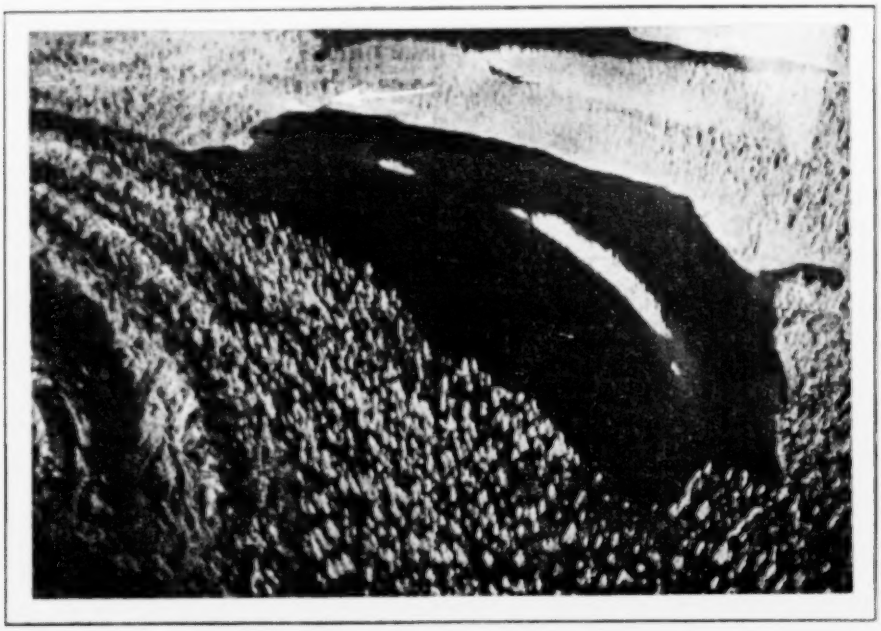


Plate 1:
Aerial view of Le Moray Lake #3 looking southwest. Arrow indicates location of outlet.

Plate 2:
Aerial view of Le Moray Lake #3 looking northeast.

Plate 3: Panoramic view looking north, taken from middle of lake.

Lake: **Le Moray (#3)**

Plate 4:
Downstream view of seasonal inlet #1, taken approx. 10 m upstream from lake.

Plate 5:
Upstream view of seasonal inlet #1, taken approx. 10 m upstream from lake.

Lake: **LE MORAY (#3)**

Plate 6: Downstream view of point sample site #1 on outlet, taken approx. 95 m downstream from the lake.

Plate 7: Upstream view of point sample site #1 on outlet, taken approx. 95 m downstream from the lake.

Plate 8: Downstream view of point sample site #2 on outlet, taken approx. 50 m downstream from lake.

Plate 9: Upstream view of point sample site #2 on outlet, taken approx. 50 m downstream from lake.

Appendix A

LABORATORY REPORT

Water Chemistry Analysis

Appendix B

TRIBUTARY STREAM DATA

System Name: **Unnamed C.** **outlet**

System No.: **234-8120-254-000**

Site Location: Sample Site #1, approx. 95 m downstream from lake.

Date:	July 28, 1992	Time:	1 100 hrs
Channel Width:	2.5 m	Water Temp.:	13°C
Wetted Width:	2.0 m	Stage (flow)	moderate
Max. Depth:	30 cm	Velocity:	no noticeable flow
Avg. Depth:	20 cm	Field Gradient:	0.2 %
Turbidity:	30 cm	Colour:	gin clear

Flood Signs:

Height: 30 cm

Type: n/a

Substrate Breakdown:

Fines	Small Gravel	Large Gravel	Cobble
2 5 %	-- %	-- %	20%
Boulder	Bedrock		
5 5 %	--%		

Substrate Compaction: moderate Sand: -%

Banks:

	Form	Height	Stability
Right	straight	0.3 m	stable due to rooted vegetation
Left	straight	0.4 m	stable due to rooted vegetation

Comments:

Field gradient measured over 10 m.
Fair rearing habitat (overstream vegetation, undercut banks).
No spawning habitat available.

System Name: **Unnamed C.** **outlet**

System No.: **234-8120-254-000**

Site Location: Sample Site #2, approx. 50 m downstream from lake.

Date:	July 28, 1992	Time:	1 120 hrs
Channel Width:	1.0 m	Water Temp.:	13^0C
Wetted Width:	0.5 m	Stage (flow)	moderate
Max. Depth:	17 cm	Velocity:	0.33 m/sec
Avg. Depth:	10 cm	Field Gradient:	7.5 %
Turbidity:	17 cm	Colour:	gin clear

Flood Signs:

Height: n/a

Type: n/a

Substrate Breakdown:

Fines	Small Gravel	Large Gravel	Cobble
5%	20%	30%	40%

Boulder	Bedrock
5 %	-- %

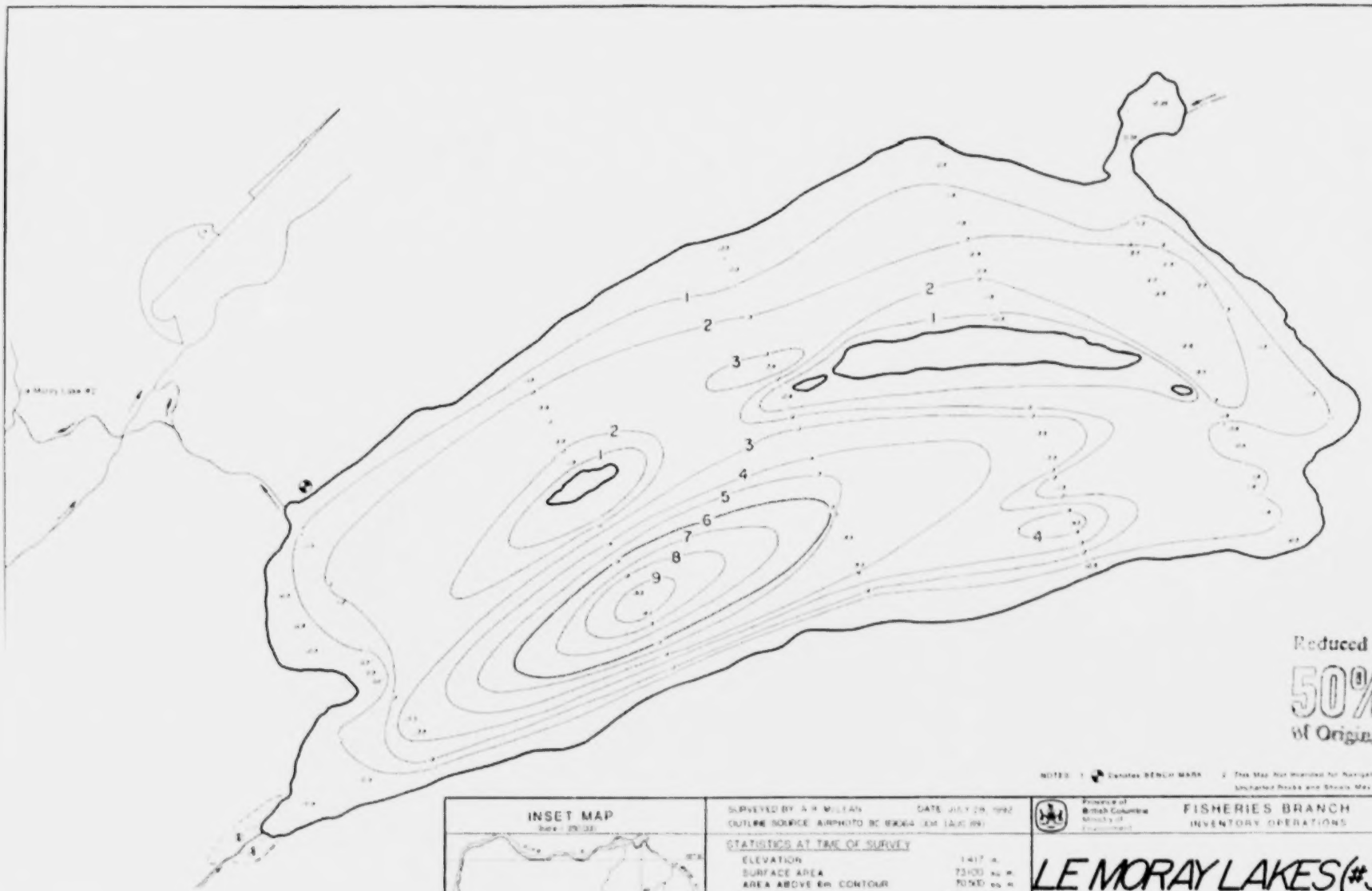
Substrate Compaction: moderate Sand: -- %

Banks:

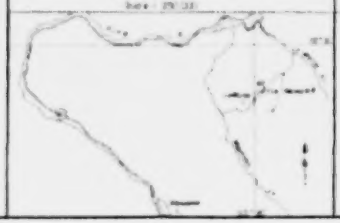
	Form	Height	Stability
Right	straight	0.2 m	stable due to rooted vegetation
Left	straight	0.2 m	stable due to rooted vegetation

Comments:

Field gradient and velocity measured over 3 m.
Poor rearing habitat at sample site (high velocity) but fair rearing habitat in general (overstream vegetation).
No spawning habitat available.



INSET MAP



SURVEYED BY A.R. MILLAR DATE JULY 29, 1992
OUTLINE SOURCE AIRPHOTO BC 89064 :30M (JUL 89)

STATISTICS AT TIME OF SURVEY

ELEVATION	1417 m.
SURFACE AREA	73400 sq. m.
AREA ABOVE 6m. CONTOUR	70500 sq. m.
VOLUME	195000 cu. m.
MEAN DEPTH	2.6 m.
MAX. DEPTH	9.5 m.
PERIMETER, MAIN SHORE	1400 m.
PERIMETER, ISLANDS	400 m.
BENCH MARK HEIGHT ABOVE WATER LEVEL	3.0 m.

Province of British Columbia
Ministry of Environment

FISHERIES BRANCH
INVENTORY OPERATIONS

LE MORAY LAKES (#3)

DEPTHS IN METERS

WATERSHED CODE: 234-620-284-100	UTM COORDINATE: 10 5326 X 459	
FIELD: A.R.M.	FAIR DWG: R.A.C.	REV. DATE:
PLOTTING: R.L.P.	FAIR DWG CHECK:	SCALE: 1:1100
CONTOURS: J.A.S.	DRAFT DATE: JULY 30/92	
CALCULATIONS: J.A.S.	APPROVED:	MAP NO. 930/8
TECH. CHECK:		